

CLAIMS

The invention claimed is:

- 5 1. A method of increasing a dynamic range of a backlit display, said method comprising the step of varying a luminance of a light source illuminating a displayed pixel in response to an intensity value of said pixel.
- 10 2. The method of claim 1 wherein the step of varying a luminance of a light source illuminating a displayed pixel in response to a intensity of value of said pixel comprises the steps of:
 - (a) determining a luminance of said pixel from said intensity value; and
 - 15 (b) varying a luminance of said light source according to a relationship of said luminance of said pixel and said luminance of said light source.
- 20 3. The method of claim 2 wherein said relationship of said luminance of said pixel and said luminance of said light source is a nonlinear relationship.
- 25 4. The method of claim 2 wherein the step of determining a luminance of a pixel from an intensity value comprises the step of filtering an intensity value for a plurality of pixels.
5. The method of claim 4 wherein said relationship of said luminance of said pixel and said luminance of said light source is a nonlinear relationship.
6. The method of claim 4 further comprising the step of sampling a filtered intensity value at a spatial coordinate corresponding to said light source.

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7. The method of claim 6 further comprising the step of rescaling a sample of said filtered intensity value to reflect a nonlinear relationship between said luminance of said light source and said intensity of said displayed pixel.

5 8. The method of claim 2 wherein the step of varying a luminance of said light source according to a relationship of said luminance of said pixel and said luminance of said light source comprises the steps of:

- 10 (a) operating said light source at substantially a maximum luminance if a luminance of at least one displayed pixel exceeds a threshold luminance; and
- (b) otherwise, attenuating said luminance of said light source according to a relationship of said luminance of said light source and a luminance of a plurality of pixels.

15 9. The method of claim 8 wherein the step of attenuating a luminance of a light source according to a relationship of said luminance of said light source and a luminance of a plurality of pixels comprises the step of attenuating said luminance of said light source according to a relationship of said luminance of said light source and a mean luminance of said plurality of pixels.

20 10. The method of claim 9 wherein the step of attenuating a luminance of a light source illuminating a pixel comprises the step of attenuating a luminance of a plurality of light sources illuminating a plurality of pixels comprising a frame in a sequence of video frames.

25 11. The method of claim 10 wherein the step of attenuating a luminance of a plurality of light sources illuminating a plurality of pixels comprising a frame in a sequence of video frames comprises the step of attenuating said luminance of said light sources for a subset of frames of said sequence, said subset

30 including less than all said frames of said sequence.

12. The method of claim 9 wherein said plurality of pixels comprises at least two contiguous pixels.

5 13. The method of claim 1 wherein the step of varying a luminance of a light source illuminating a displayed pixel comprises the step of varying a luminance of a plurality of light sources illuminating a plurality of displayed pixels substantially comprising a frame in a sequence of video frames.

10 14. The method of claim 13 wherein the step of varying a luminance of a plurality of light sources illuminating a plurality of pixels substantially comprising a frame in a sequence of video frames comprises the step of varying said luminance of said light sources for less than all frames of said sequence.

15 15. A method of increasing the dynamic range of a backlit display, said method comprising the steps of:

(a) determining a luminance of a pixel of an image from a data value for said pixel;

(b) filtering said luminance;

20 (c) determining a maximum of said filtered luminance for a plurality of pixels illuminated by a light element of a backlight;

(d) determining a statistical value of said filtered luminance for a plurality of pixels illuminated said light element; and

25 (e) illuminating said light element according to a relationship of said maximum of said filtered luminance and said statistical value of said filtered luminance.

30 16. The method of claim 15 wherein said statistical value of said luminance comprises a mean luminance of said plurality of pixels.

17. The method of claim 15 wherein step of illuminating a light element according to a relationship of a maximum of a filtered luminance for a plurality of pixels and a statistical value of said filtered luminance for a plurality of pixels comprises the steps of:

5 (a) illuminating said light source at a maximum luminance if said maximum of said filtered luminance exceeds a threshold luminance; and

10 (b) otherwise, illuminating said light source at an attenuated luminance, said attenuated luminance determined by a relationship of said statistical value of said luminance of said plurality of pixels and a luminance level of said light source,

15 18. The method of claim 17 wherein said relationship of said statistical value of said luminance of said plurality of pixels and a luminance level of said light source is a nonlinear relationship.

19. A backlit display comprising:

20 (a) a plurality of light source elements;
(b) a light valve arranged for locally modulated transmittance of light from said light source elements, said locally modulated transmittance being responsive to a data value of an image pixel; and

25 (c) a light source controller to modulate a luminance output of a light source element according to a relationship of said luminance output and said data value of said image pixel.

20. The apparatus of claim 19 wherein said light source controller comprises:

30 (a) a data processing unit to determine a power to be applied to a light source element to cause said light source

- element to emit a luminance output satisfying said to said data value of said image pixel; and
- (b) a light element driver to apply said power to said light source element.

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21. A backlight for a display comprising a plurality of light sources, at least one light source being controllable to output light at a luminance level independent of a luminance level of light output by another of said light sources.

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22. The apparatus of claim 21 further comprising a light source driver controlling said luminance level of light output by said at least one light source according to a relationship of said luminance level of said output light and a data value for a displayed pixel.